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EXAMINER

PHAN, THIEM D

ART UNIT	PAPER NUMBER
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3729

DATE MAILED: 09/22/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/092,547

Applicant(s)

FUKUNAGA ET AL.

Examiner

Tim Phan

Art Unit

3729

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 15-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14, 18-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. The Restriction mailed on or about 14<sup>th</sup> May 2003 has been carefully reviewed. It is noted that in addition to Claim 17, Claims 15 and 16 are also written as products. Claims 15 and 16 are regrouped and placed into Group II invention. With this revised Restriction, the Claims which are now being examined are Claims 1-14 and 18-23.

An Office Action on the merits of Claims 1-14 and 18-23 now follows.

### ***Title***

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2. The following title is suggested: "A Method of Manufacturing a Motor Comprising Rare Earth Thick Film Magnet".

***Drawing Objection***

3. The drawing (Cf. Fig. 2, element 23) is objected to under 37 CFR 1.83(a) because it fails to show the laser beam radiation focusing on the target (instead of the substrate) for abrasion as described in the specification (Cf. Page 7, lines 22 & 23). Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Also the symbol “ $\Phi$ ” is to be deleted from Figure 1.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 13 and 14 are rejected under 35 U.S.C. 101 because in 35 U.S.C. 101 “... may obtain a patent therefor ...” This has historically been interpreted to mean one (1) patent for one invention. Claim 13 is identical to claim 14.

*Claim Rejections - 35 USC § 102*

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1; 2 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Mikio et al (JP09-237714) hereinafter '714.

As applied to claim 1, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor (Cf. Detailed Description, Paragraph 1, line 3), comprising:

- forming hard magnetism layers  $R_x-B_y-TM_z$  containing 10-20 at % ( $x = 0.1-0.2$ ) R where R is selected from rare earth elements, 5-20 at % ( $y = 0.05-0.2$ ) B (Boron) and remainder ( $z = 1-x-y$ ) TM (Cf. Detailed Description, Paragraph 8, lines 1-3) at a thickness of 5-100nm including  $R_2-TM_{14}-B$  phase (Cf. Detailed Description, Paragraph 8, line 5) on a substrate (Cf. Fig. 1; Detailed Description, Paragraph 10, line 10) by physical deposition process such as using the bipolar magnetron-sputtering equipment (Cf. Detailed Description, Paragraph 13, line 1);
- heat treating the thick multilayer of rare earth film magnet  $R_2-TM_{14}-B$  (Cf. Detailed Description, Paragraph 12, lines 9 & 10).

**As applied to claim 2**, the '714 teaches the lamination of several layers into a multilayer (Cf. Fig. 1; Detailed Description, Paragraph 7, lines 1-3) on the substrate.

**As applied to claim 8**, the '714 teaches the vacuum pressure at forming the magnet film at  $8 \times 10^{-4}$  or less Pa (Cf. Detailed Description, Paragraph 13, line 3).

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 3, 4, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of Araki et al (US 5,676,998) hereinafter '998.

**As applied to claim 3**, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches the magnet film deposition by laser ablation or abrasion (Cf. Fig. 3, element 16; column 5, line 25) in order to produce a magnet film with a high residual magnetization or coercive force.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying the laser abrasion process (as taught by the '998) in order to produce a magnet film with a high residual magnetization or coercive force.

**As applied to claim 4**, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches a metal substrate of iron-cobalt alloy (Cf. column 8. lines 47-50; Table 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying the metal substrate of iron-cobalt alloy (as taught by the '998) in order to obtain a maximum energy product.

**As applied to claim 7**, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches a film deposition rate of 40 micrometer per hour (Cf. column 8. line 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying film deposition rate of 40 micrometers per hour (as taught by the '998) in order to speed up the lamination.

10. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714.

**As applied to claim 9**, the '714 teaches the heat treatment from 500 – 800 degrees C with larger coercive force at lower end temperature range (Cf. Detailed Description, Paragraph 18, lines 6-8).

**As applied to claim 10**, the '714 teaches the heat treatment. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply electric current for control-heating, since it was known in the art that the magnet film lamination is optimized at certain controlled temperature.

**As applied to claims 11 and 12**, the '714 teaches the lamination of multilayer of magnet films which are smoothly laid and pressed on top of each other while being heat-treated by electric current in the direction of thickness (CF. Fig. 1).

11. Claims 13 and 14 are further rejected under 35 U.S.C. 103(a) as being unpatentable over the '714.

The '714 teaches the claimed invention except for heat treating the lamination at a heating speed higher than 9 degree C per second, at a pressure of 200-400 kgf/ cm-square and a degree of vacuum of 1 Torr or less.

It would have been an obvious matter of design choice to heat-treat the lamination at a heating speed higher than 9 degree C per second, at a pressure of 200-400 kgf/ cm-square and a degree of vacuum of 1 Torr or less, since it was known in the art that the invention would perform equally well at a heat-treatment of 600 degrees C in 30 minutes and at a vacuum less than 1 Torr or Pa (Cf. Detailed Description, Paragraph 13, line 14).



12. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of the '998 and further view of Akioka et al (US 5,597,425) hereinafter '425.

The '714 and '998 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '425 teaches that the tantalum should be added to the rare earth film magnet (Cf. column 5, lines 3-5) in order to increase the coercive force or high residual magnetization.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by adding the tantalum (as taught by the '425) to the rare earth film magnet or the substrate surface where rare earth film magnet is formed in order to increase the coercive force or high residual magnetization.

13. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of Bell et al (US 5,682,670) hereinafter '670.

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**As applied to claim 18**, the '714 teaches a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations, including:

- forming hard magnetism layers Rx-By-TMz containing 10-20 at % ( $x = 0.1-0.2$ ) R where R is selected from rare earth elements, 5-20 at % ( $y = 0.05-0.2$ ) B (Boron) and remainder ( $z = 1-x-y$ ) TM (Cf. Detailed Description, Paragraph 8, lines 1-3) at a thickness of 5-100nm including R2-TM14-B phase (Cf. Detailed Description, Paragraph 8, line 5) on a substrate (Cf. Fig. 1; Detailed Description, Paragraph 10, line 10) by physical deposition

process such as using the bipolar magnetron-sputtering equipment (Cf. Detailed Description, Paragraph 13, line 1);

- heat treating the thick multilayer of rare earth film magnet R2-TM14-B (Cf. Detailed Description, Paragraph 12, lines 9 & 10);
- building a lamination of rare earth film magnet into a motor (Cf. Detailed Description, Paragraph 1, line 3).

The '670 teaches the process of magnetizing rare earth magnets for smaller motors (Cf. column 2, lines 9 and 42-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two teachings by applying the magnetizing process (as taught by the '670) in order to obtain the more complex magnetizing patterns in smaller motors.

**As applied to claim 19**, the '714 teaches the lamination of several layers into a multiplayer (Cf. Fig. 1; Detailed Description, Paragraph 7, lines 1-3) on the substrate.

14. Claims 20, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of the '670 and further view of the '998.

**As applied to claim 20**, the '714 and '670 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches the magnet film deposition by laser ablation or abrasion (Cf. Fig. 3, element 16; column 5, line 25) in order to produce a magnet film with a high residual magnetization or coercive force.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by applying the laser abrasion process (as taught by the '998) in order to produce a magnet film with a high residual magnetization or coercive force.

**As applied to claim 21,** The '714 and '670 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '998 teaches a metal substrate of iron-cobalt alloy (Cf. column 8, lines 47-50; Table 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by applying the metal substrate of iron-cobalt alloy (as taught by the '998) in order to obtain a maximum energy product.

15. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '714 in view of the '670 and further view of the '425.

The '714 and '670 teach a method of manufacturing a rare earth film magnet layer for small motor which reads on all applicants' claimed limitations.

The '425 teaches that the tantalum should be added to the rare earth film magnet (Cf. column 5, lines 3-5) in order to increase the coercive force or high residual magnetization.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three teachings by adding the tantalum (as taught by the '425) to the rare earth film magnet or the substrate surface where rare earth film magnet is formed in order to increase the coercive force or high residual magnetization.

### *Conclusion*

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tim Phan whose telephone number is 703-605-0707. The examiner can normally be reached on M - F, 9AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1148.



Tim Phan  
Examiner  
Art Unit 3729



CARL J. ARBES  
PRIMARY EXAMINER

tp  
September 11, 2003